UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,964	08/23/2001	Makoto Higashiyama	F-7128	1542

28107 7590 08/26/2004

JORDAN AND HAMBURG LLP
122 EAST 42ND STREET
SUITE 4000
NEW YORK, NY 10168

EXAMINER	
JANKUS, ALMIS R	

ART UNIT	PAPER NUMBER
2671	6

DATE MAILED: 08/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/935,964	HIGASHIYAMA ET AL.	
	Examiner	Art Unit	
	Almis R Jankus	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-15 and 17-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *19-21* is/are allowed.

6)☒ Claim(s) *1-7, 9-15, 17-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicants' amendment of 6/7/04 has been fully considered in preparing this office action.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-7, 9-15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Watt et al.

With respect to claim 1, Watt et al. teaches the claimed "vertex sorting means for sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the light source", at pages 3-6 and 155-166. More specifically, since the instant specification discloses no particular type of "sorting", (i.e., binary sorting, bubble sorting, bucket sorting, etc.) it is assumed that "sorting" simply refers to determining which vertices of the polygon forming the solid model are visible-surface

vertices facing in a direction toward a light source and which vertices are hidden-surface vertices facing in a direction opposite the light source. At pages 3-6 Watt et al. teaches that the workhorse apparatus for three-dimensional graphics has been a basic system that renders objects represented by a set of polygons. Then, Watt et al., establishes the relationships among polygons, edges and vertices in computer representations of three-dimensional objects. Note that in figures 1.1 and 1.2, whether using polygon-based representation or edge-based representation respectively, a vertex array, including vertex coordinates and vertex normals, is a fundamental requirement. Further, at page 3, Watt et al. teaches that "Most renderers work with objects that are represented by a set of polygons", and "Geometric information is only stored at the polygon vertices". Now at page 161, Watt et al. teaches separating "polygons that can see the light from those that cannot". Given that a polygon's vertices are inherent to the polygon, it follows that a polygon "that can see the light" has vertices "that can see the light", and a polygon that cannot see the light has vertices that cannot see the light. Therefore, Watt et al. teaches the limitation of "vertex sorting means for sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the light source".

Watt et al. also teaches the claimed shadow model generating means for deforming the solid model by moving the hidden-surface vertices in a propagating direction of rays from the light source, at pages 155-166. More specifically, starting at page 160 Watt et al. teaches "shadow volumes". As can be seen at figure 5.6 and at

the last paragraph of page 161, a shadow volume is generated by casting edges of those polygons which cannot see the light, away from the light. The solid model is "deformed" in the sense that a shadow volume is formed which extends from the silhouette edge of the solid model, in a direction away from the light. Since vertices define the silhouette edge it is inherent that extending an edge also extends the vertices.

Amended claim 1 further requires "said solid model being a character movable in a height direction in a simulated 3D space such that the character as a whole rises above and leaves a ground surface in the simulated 3D space", which is taught at Watt et al. at the left column at page 155, and at figure 5.1 which illustrates three spheres and a ground plane. Figure 5.1(b) shows the sphere to be resting on the ground plane and figure 5.1(c) shows the sphere raised above it.

The claim further requires the shadow model generating means to produce "a deformed shadow on the ground surface reflecting a distorted shape of the character when the character as a whole rises above and leaves the ground surface". The shadows produced on the ground plane at figures 5.1(b) and 5.1(c) are different from each other according to whether the sphere is resting on the ground plane, or as a whole rises above and leaves the ground plane respectively. At figure 5.1(b) the shadow is partly obscured by the sphere resulting in a shadow shape; at figure 5.1(c) the shadow is not obscured by the sphere resulting in a different shadow shape, and is displaced in position because the relative position of the light source and the sphere are

changed. Thus, the shadow is deformed (changes form) when the sphere is raised above the ground.

In this rejection, the claimed "distorted shape of the character" is taken to have the same meaning as - the character which has left the ground surface and has risen above it causing a deformed shadow - because there is no teaching in the specification of distorting the shape of a character.

The claim preamble, "A video game system, comprising:" is considered a use of the claimed invention and is given no patentable weight. The preamble does not recite essential structure or steps or is necessary to give life, meaning and vitality to the claim. The body of the claim is a self-contained description of the structure and does not depend on the preamble for completeness.

Claim 2 depends from claim 1 and further requires the vertex sorting means to sort the vertices into the visible-surface vertices and the hidden-surface vertices based on whether an inner product of a normal vector of each vertex of each polygon and a light source vector representing the propagating direction of the rays from the light source is a positive or negative value. Watt et al. teaches this at listing 5.1 on page 162. "NdotL" is the variable which contains the results of the inner product of the normals and light source vector; "see_table[I+1]" is the variable which contains the boolean true or false ("1 : 0") based on whether "(NdotL > 0.)?", i.e., whether the inner product has a positive or negative value.

Claims 3, 4 and 5 depend from claim 1 and further require the shadow model generating means to move specified vertices in parallel with the propagating direction of the rays from the light source (claim 3); defining a shadow model shape tapered in a moving direction (claim 4); and defining a shadow model shape swollen in a moving direction (claim 5). .

Watt et al. teaches this at pages 164-165 and 157. At pages 164-165 Watt et al. teaches generating shadow volumes due to an area light source which form an "umbra" shadow volume which is the intersection of shadow volumes generated from each vertex of the area light source. At page 157 at figure 5.2 Watt et al. teaches that the umbra shadow is related to the size of the light source and the size of the shadowing object. As can be seen at figure 5.2, a light source which is larger than a shadowing object produces a tapered umbra shadow volume; a light source which is equal in size to the shadowing object produces an umbra shadow volume with parallel sides; and a light source which is smaller than the shadowing object produces an umbra shadow volume which is swollen in the moving direction.

Claim 6 depends from claim 1 and further requires shadow creating means for sorting the polygons forming the shadow model into front-facing polygons facing in a direction toward a viewpoint of a virtual camera and back-facing polygons facing in a direction opposite from the viewpoint of the virtual camera, and creating a shadow image in pixels which are pixels corresponding to the front-facing polygons minus pixels corresponding to the back-facing polygons.

Watt et al. teaches this at pages 163-164 and at pages 6-9. At pages 163-164 Watt et al. teaches "A frontfacing shadow polygon puts anything behind it in shadow while a backfacing shadow polygon cancels the effect of a frontfacing one. A polygon that lies between these two shadow polygons will be in shadow", and determining pixel values based on the juxtaposition of the shadow polygons with respect to the viewing direction (see figure 5.10).

Claim 6 also requires a "viewpoint of a virtual camera". Watt et al. teaches this at pages 6-9, more specifically at section 1.2.3 "Eye or camera coordinate system" which teaches "virtual camera" merely being a convention for a viewpoint, which viewpoint can be seen at figure 5.10, and as a "view frustum" at figure 5.6.

Claim 7 depends from claim 1 and further requires shadow creating means for creating a shadow image of the solid model using the shadow model, first storage means for storing the created shadow image of the solid model, second storage means for applying rendering to the polygon models except the shadow model and storing the thus created image, and combining means for reading and combining the image stored in the first storage means and the one stored in the second storage means. Watt et al. teaches this at pages 3-9 and at page 160. The first storage means is taught at page 160 with the teaching of "The shadow volume itself is polygonal, being made up of shadow polygons which are generated and added to the polygonal database prior to rendering"; thus, this database entry suffices for the claimed first storage means. The second storage means is taught at page 5 at figure 1.1 which teaches the arrays used

in a polygonal database. The database of figure 1.1 is used for applying rendering to the polygon models except the shadow models because, as is taught at page 160 "shadow polygons are invisible, in that they are not explicitly rendered and do not affect the visibility calculations". The combining means for reading and combining the image stored in the first storage means and the one stored in the second storage means is taught at page 160 with "Their function [shadow polygons] is, during the depth sort required by the hidden surface solution, to provide information to the real polygons of their positions with respect to the shadow volume".

Claims 9-15 are similar to claims 1-7 respectively, except that claims 9-15 require a readable storage medium storing a three-dimensional image processing program. Watt et al. teaches this three-dimensional image processing program at page 162 at listing 5.1 which is clearly readable, and stored on the medium of paper.

Claim 17 is similar to claim 1 but is drafted in method form. Claim 17 is rejected under the same rationale applied to respective components of claim 1 which perform the claimed steps of claim 17.

4. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watt et al. in view of Shigeru et al. (EP 0 916 374 A).

With respect to claim 18, Shigeru et al. teaches the claimed video game system, at the abstract; the three-dimensional image processing apparatus for generating a shadow, at figure 2, item 10; the image display means for displaying images, at figure 2, item 30; the program storage means storing a game program data, at figure 2, item 21; the externally operable operation means, wherein the three-dimensional image processing apparatus displays images on the image display means in accordance with the game program data, at figure 2, items 40.

Watt et al. teaches the claimed "vertex sorting means for sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the light source", at pages 3-6 and 155-166. More specifically, since the instant specification discloses no particular type of "sorting", (i.e., binary sorting, bubble sorting, bucket sorting, etc.) it is assumed that "sorting" simply refers to determining which vertices of the polygon forming the solid model are visible-surface vertices facing in a direction toward a light source and which vertices are hidden-surface vertices facing in a direction opposite the light source. At pages 3-6 Watt et al. teaches that the workhorse apparatus for three-dimensional graphics has been a basic system that renders objects represented by a set of polygons. Then, Watt et al., establishes the relationships among polygons, edges and vertices in computer representations of three-dimensional objects. Note that in figures 1.1 and 1.2, whether using polygon-based representation or edge-based representation respectively, a vertex array, including vertex coordinates and vertex normals, is a fundamental requirement. Further, at page 3, Watt et al.

teaches that "Most renderers work with objects that are represented by a set of polygons", and "Geometric information is only stored at the polygon vertices". Now at page 161, Watt et al. teaches separating "polygons that can see the light from those that cannot". Given that a polygon's vertices are inherent to the polygon, it follows that a polygon "that can see the light" has vertices "that can see the light", and a polygon that cannot see the light has vertices that cannot see the light. Therefore, Watt et al. teaches the limitation of "vertex sorting means for sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the light source".

Watt et al. also teaches the claimed shadow model generating means for deforming the solid model by moving the hidden-surface vertices in a propagating direction of rays from the light source, at pages 155-166. More specifically, starting at page 160 Watt et al. teaches "shadow volumes". As can be seen at figure 5.6 and at the last paragraph of page 161, a shadow volume is generated by casting edges of those polygons which cannot see the light, away from the light. The solid model is "deformed" in the sense that a shadow volume is formed which extends from the silhouette edge of the solid model, in a direction away from the light. Since vertices define the silhouette edge it is inherent that extending an edge also extends the vertices.

The claim further requires "said solid model being a character movable in a height direction in a simulated 3D space such that the character as a whole rises above

and leaves a ground surface in the simulated 3D space", which is taught at Watt et al. at the left column at page 155, and at figure 5.1 which illustrates three spheres and a ground plane. Figure 5.1(b) shows the sphere to be resting on the ground plane and figure 5.1(c) shows the sphere raised above it.

The claim further requires the shadow model generating means to produce "a deformed shadow on the ground surface reflecting a distorted shape of the character when the character as a whole rises above and leaves the ground surface". The shadows produced on the ground plane at figures 5.1(b) and 5.1(c) are different from each other according to whether the sphere is resting on the ground plane, or as a whole rises above and leaves the ground plane respectively. At figure 5.1(b) the shadow is partly obscured by the sphere resulting in a shadow shape; at figure 5.1(c) the shadow is not obscured by the sphere resulting in a different shadow shape, and is displaced in position because the relative position of the light source and the sphere are changed. Thus, the shadow is deformed (changes form) when the sphere is raised above the ground.

In this rejection, the claimed "distorted shape of the character" is taken to have the same meaning as - the character which has left the ground surface and has risen above it causing a deformed shadow - because there is no teaching in the specification of distorting the shape of a character.

It would have been obvious to one of ordinary skill in the art at the time of the instant invention to generate more accurate shadows, as taught at Watt et al. in a game system, as taught at Shigeru et al. because shadows play a subtle and vital role

in our visual perception of an environment. The position and orientation provide information as to how objects relate to each other in space. This motivation is provided at Watt et al. at page 155, first paragraph.

5. Applicant's arguments with respect to claims 1-7, 9-15, 17 and 18 have been considered but are moot in view of the new ground(s) of rejection.

6. Claims 19-21 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter: With respect to claim 19, the prior art of record does not fairly teach the claimed memory unit including a shadow model generating section having a hidden-surface magnification data portion which stores magnification rates at which the hidden-surface vertices are magnified in 3D space.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Almis R Jankus whose telephone number is 703-305-9795. The examiner can normally be reached on M-F, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 703-305-9798. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AJ

ALMIS R. JANKUS
PRIMARY EXAMINER